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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

March 31, 2003

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Ms. Susan Roth
6236 27th Avenue NE
Seattle, WA 98115-7114

Dear Ms Roth:

Re: **Soil Vapor Technical Memorandum #2**
Terminal 91 Tank Farm Site
Agreed Order #: DE 98HW-N108

On October 29, 2002, the Washington State Department of Ecology (Ecology) received your *Soil Vapor Technical Memorandum #2*, prepared by the Philip Services Corporation for the PLP Group. Ecology appreciates your submittal of the document. Our review of the document was the subject of an Email sent to you in 2002 and discussions held between the PLPs and Ecology on March 28, 2003.

In the Tech Memo the PLPs propose that the vapor intrusion pathway be "screened-out" at Building M28. Though it does not appear to be specifically mentioned in the document, it seems that your contention about the pathway is based on a finding that only acceptable levels of risk are posed for both current and future exposure scenarios. Ecology concurs that it appears unlikely that current or future risks to workers are unacceptable (exceed MTCA Cleanup Levels) if: a) preferred vapor migration routes are mitigated; b) past sampling and analysis has properly accounted for the potential for LNAPL to impact indoor air quality; and, c) petroleum fractions in groundwater beneath the building are not unacceptably impacting indoor air quality.

The Department's comments on Tech Memo #2 are enclosed. The majority of these concerns were forwarded to you, as noted above, in a previous Email. The PLPs should address the comments in a revision of the document submitted within thirty (30) days of receipt of today's letter. The revision may take the form of an errata sheet or replacement pages, if this simplifies the submission.

If you have any questions concerning this correspondence, please contact me at (425) 649-4449 in Galen Tritt's absence. I look forward to working with you over the next two months.

Sincerely,

Ed Jones
Environmental Engineer
RAFT/HWTR

EJ:sd

Enclosure

cc: Galen Tritt, NWRO
Julie Sellick, NWRO
Jan Palumbo, EPA X
Central Files, HZW 6.6.2

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COMMENTS

TERMINAL 91
Soil Vapor Technical Memorandum #2

Comment	Page	PLP statement/action	Comment
1	11	Indoor air risk, due to vapor intrusion from groundwater (GW), is estimated – via the Johnson Ettinger Model (JEM) – to be **7E-7**[1].	However, Table 6 shows this risk to be 1.36E-6 (for data from 2/00 – 3/02) and Table 7 shows this risk to be 1.2E-6 (for data from 3/02). Table 9, referenced in the text, does not appear to contain modeling results for GW inputs. Table 4c in the Tech Memo shows that an averaging time (AT) of 70 years was used for the JEM run. Equation 720-2 in the MTCA regs, however, indicates that this period should be 75 years. In general, the proper way to use the modeling results is to obtain resultant indoor air concentrations from the JEM spreadsheet *Intercalc* pages and use those numbers in the MTCA 750 equations (to estimates risks and hazards, and calculate CULs).
2	11	The PLPs applied an attenuation factor of 0.001 to soil gas results to predict indoor air concentrations.	This method was recommended by Ecology (Hun Seak Park) during a meeting held at the site on 2/19/02. The revised Tech Memo should note, however, that EPA's draft OSWER Vapor Intrusion guidance (2002) suggests using a factor of 0.1 for shallow soil gas (shallower than 5') and 0.01 for deeper soil gas. It is acknowledged that these are conservative values, but the difference between EPA's recommendations and Ecology's should be noted in describing the vapor intrusion assessment uncertainty.

[1] From **detected** COPCs.

3	12	Indoor air risk, due to vapor intrusion from soil gas, was estimated – via multiplication by an α of 0.001 – to be **9.2E-8**[2] (Table 9).	It appears, however, that the text describes this same risk as 3E-7.
4	11	The PLPs used the JEM to estimate indoor air COPC levels by inputting max soil values from samples TB6, CP109, CP118, and HA10. The indoor air risk, due to vapor intrusion from subsurface soils, was estimated – via the JEM – to be 2E-7[3].	EPA does not currently endorse using the JEM with soil inputs, if the objective of the analysis is to screen-out the vapor intrusion pathway. The revised document should therefore acknowledge that there is considerable uncertainty associated with JEM results based on soil COPC inputs.
5	7	SIM analyses were not conducted, and as a consequence, some DLs[4] were above Method C air CULs.	In the revised document the PLPs should recalculate the predicted indoor concentrations and risks for these compounds with elevated DLs as noted in Comments 8 and 12 below (i.e., continue to assign these constituents a value of DL/2, but re-run the JEM and apply both cancer and noncancer toxicity information to the resulting predictions).
6	9	No COPCs were detected in soil gas at Port 39-6.	No explanation is given for the absence of detectable levels of COPCs at this port. In the revised document the PLPs should provide a hypothesis for not measuring COPCs at this particular location.
7	10	The PLPs used RLs for certain non-detected COPCs[5], but used zeroes for others.	For the COPCs which were assigned RL concentrations, this is a conservative approach. However, for those COPCs not detected (though present), and not assigned any value, the approach leads to an underestimation of risk.
8		The Tech Memo concludes that the risk via TCE inhalation is acceptable.	A slope factor of 0.4 should have been used for the assessment of TCE's risk. Using this value increases the risk (over what was presented in the document), but still

[2] From detected COPCs in soil gas (Table 9). The risk increases to 1.7E-7 (or is it 5E-7?) if 5 NDs are assigned a value = RL.
[3] From detected COPCs only.
[4] 1,1,2-TCA; 1,2-DCA; 1,3-DCB; 1,4-DCB; chloroform
[5] i.e., those COPCs which had been detected in soil gas at levels exceeding MTCA Method C CULs

(8)			leads to predicted indoor TCE concentrations below the MTCA method C CUL (0.2 ug/m3). However, in the revised document the PLPs should use the most up-to-date toxicity information, and use both cancer as well as non-cancer toxicity information for those compounds which have dual effects. So, for example: a) the most recent information should be used for TCE, as both a carcinogen and a noncarcinogen; b) benzene's noncancer inhalation value should be used in the calculation of the HI; c) xylene has a new RfC which should be used; d) chloroform, chloromethane, and PCE have noncancer values (as well as cancer values) which should be used in the calculation of the HI.
9		The Tech Memo did not mention the likely LNAPL contribution to soil gas and indoor air.	By using soil gas measurements, the PLPs sought to account for soil gas contamination below the building where GW is covered by LNAPL. If soil gas measurements reliably represented the sub-slab gas levels present, this would be an acceptable approach – as long as the measurements included all the LNAPL VOCs of interest/concern. The revised document should note that Ecology and/or the PLPs intend to sample and analyze LNAPL prior to concluding that vapor intrusion is not a concern at Building 28.
10		The Tech Memo proposes filling-in the "garage-side" sump.	Ecology agrees. This appears to be a preferential pathway. As the parties discussed on April 28, the PLPs should also identify other sub-slab features (such as other sumps, drains, floor-scales). If these cavities cannot be filled-in, efforts should be made to seal them so that vapors cannot

(10)			migrate through them to indoor air.
11		No mention is made of the toxicity of (any) petroleum fractions in indoor air, contributed by soil gas.	The PLPs were not tasked – in the approved work plan – to evaluate indoor air levels of petroleum fractions, and there was no expectation that such an analysis would be included in the Tech Memo. Nevertheless, petroleum fractions have noncancer toxicity, and Ecology must assess (in some fashion) the potential for such fractions to be at levels in indoor air exceeding State CULs before screening out the vapor intrusion pathway. It is recommended that the PLPs analyze GW samples near Building 28 for EPH/VPH one time. This data may then be used to estimate potential indoor air concentrations via a methodology designed by Hun Seak Park (Ecology) and Marcia Bailey (EPA)[6].
12		In configuring the JEM runs, the PLPs used a soil temperature input of 10 degrees and the soil water-filled porosity default value (0.3) for sand.	In the revised document a soil water-filled porosity value of 0.054 should be used for sand in the JEM. Ecology assumes that a better temperature value would be closer to 15 degrees (for August). However, such an adjustment should have little effect on concentration predictions, so if site soils were likely to be warmer than 10 degrees, this "error" may be simply mentioned in the uncertainty discussion.

[6] the methodology was presented to Philip Services Corporation at a Georgetown technical meeting several months ago. A write-up of the approach can be provided to the PLPs upon request.